Optimizing Diagnosis and Management of Community-acquired Pneumonia in the Emergency Department

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KEYWORDS

• Pneumonia • Community-acquired pneumonia • Diagnosis and management
• Emergency medicine

KEY POINTS

- Community-acquired pneumonia (CAP) is a common cause of emergency department (ED) visit with higher mortality in the youngest and oldest patients.
- ED-specific guidelines do not recommend the routine use of polymerase-chain reaction pathogen assays or other biomarkers to guide antibiotic initiation.
- Recommend empiric treatment for low-risk outpatients with no comorbidities is amoxicillin or doxycycline. In patients with comorbidities and/or risk factors for resistant organisms, this should be escalated to combination therapy with a beta-lactam and beta-lactamase inhibitor plus doxycycline or a macrolide.
- Blood and sputum cultures should be obtained in patients with severe CAP and those initiated on broad-spectrum antibiotics.

INTRODUCTION

Pneumonia is split into 3 diagnostic categories: community-acquired pneumonia (CAP), health care-associated pneumonia, and ventilator-associated pneumonia. This classification scheme is driven not only by the location of infection onset but also by the predominant associated causal microorganisms. Pneumonia is diagnosed in over 1.5 million US emergency department (ED) visits annually (1.2% of all visits),[1]

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and most pneumonia diagnosed by emergency physicians is CAP. CAP is associated with a low (1%) mortality rate in those treated as an outpatient but up to 50% mortality of intensive care unit (ICU) patients; both the youngest and oldest age groups experience higher mortality.[2] Further, it is estimated that one-third of hospitalized CAP patients die within 1 year.[3] Thus, a clear understanding of the most up-to-date diagnostic modalities and treatment recommendations is critical.

CURRENT GUIDELINES

The most current relevant guidelines for treatment of CAP in the ED are the 2019 Infectious Disease Society of American/American Thoracic Society (IDSA/ATS) CAP guidelines,[4] the 2020 American College of Emergency Physicians (ACEP) Clinical Policy,[5] and the 2011 Pediatric Infectious Diseases Society and IDSA CAP pediatric guidelines.[6] Recently published recommendations from the European Respiratory Society, the European Society of Intensive Care Medicine, and Latin America Thoracic Association provide guidelines specifically for the management of severe CAP.[7]

DIAGNOSTIC CRITERIA

Both the 2019 IDSA/ATS CAP guidelines[4] and 2020 ACEP Clinical Policy[5] define pneumonia as symptoms of pneumonia plus radiographic evidence of pneumonia. This definition was not updated from previous guidelines, and at this time, this clinical/radiographic combination definition is the diagnostic standard. However, these criteria have significant limitations that must be considered by clinicians including but not limited to their performance in certain populations and the accuracy of chest radiographs.

CAP is further classified into nonsevere or severe based on the acuity of illness. The IDSA/ATS provide specific criteria for severe CAP that include factors such as specific vital sign abnormalities and need for vasopressors or mechanical ventilation.[4] Severe CAP is defined by the presence of at least 1 major criterion or 3 minor criteria. Empiric antibiotic recommendations vary depending on whether or not the patient meets severe CAP criteria or has risk factors for infection with multidrug-resistant organisms. Populations that require special therapeutic considerations include pediatrics, geriatrics, and those with recent international travel.

PATHOPHYSIOLOGY

In the most basic terms, pneumonia is an infection of the lungs. In the majority of cases, causative organism enters through inhalation or migration from the upper respiratory tract or aspiration. While aspiration causes 5% to 15% of CAP[8] and is traditionally associated with geriatric and comorbid patients, aspirating small volumes of upper airway secretions can occur in young and healthy individuals during sleep.[9] Rarely, pneumonia is caused by hematogenous spread, such as from right-sided endocarditis.

CAUSES OF PNEUMONIA

CAPs are most commonly caused by single bacteria, virus or in rare circumstances fungal organisms. Coinfections are rare but can also occur, particularly with a virus and bacterial pathogen. The causative bacterial agents in CAP are classically identified, in order, as *Streptococcus pneumoniae, Haemophilus influenzae, Staphylococcus aureus*, and gram-negative bacilli.[10,11] Importantly, the “atypical” bacteria are also important to consider as *Mycoplasma* is identified in 4% to 11% of CAP and *Legionella* in 3% to 8%.[11] A recent study that included only hospitalized CAP

patients with a "high-quality" sputum specimens identified a causative pathogen in 95.8%, with one-quarter being components of normal respiratory flora rather than the bacterial pathogens classically implicated as earlier.[12] The authors hypothesized that aspiration of oral flora may been an important yet underappreciated cause of CAP. A 2016 meta-analysis examined the use of viral polymerase chain reaction (PCR) from upper airway swabs in adults with CAP; pooled estimates identified a viral pathogen in 24.5% (95% CI 21.5%–27.5%). Only 2 studies in the review reported on viral pathogens from lower respiratory specimens, with prevalence reported at 44.2%. Of note, coinfection by bacteria and viral pathogens doubled the odds of death.[10]

Depending on the study, the most common causative pathogens identified varies, likely due to the varying types of diagnostic modalities used, quality of specimens and patient populations. For example, PCR assays may have higher diagnostic yield than traditional culture methods but may also identify colonizing pathogens.[13] This likely explains why some studies have found higher rates of viral organisms and variations based on age (see Special Populations later section).[14,15] It is important to recognize that diagnostic yield is directly related to the sample quality and consider ED-specific barriers to optimal collection.[16–19] For example, in the ED, expectorated sputum is the primary sample source, which is associated with known quality limitations.[20]

COVID-19

The COVID-19 pandemic showed the potential for devastation from a novel viral pneumonia pathogen with young children (<1 year) and older adults being at highest risk of mortality.[21] Bacterial coinfection with SARS-CoV-2 estimates vary greatly with a recent meta-analysis reporting a rate of approximately 7%.[22–24] As with non-SARS-CoV-2 infections, bacterial coinfection with SARS-CoV-2 is associated with increased risk for severe disease (ICU admission, mechanical ventilation) and death.[25] Public health measures instituted during this pandemic decreased the transmission of other common pneumonia pathogens.[26] COVID-19 is discussed in detail elsewhere in this issue.

Influenza

Prior to the COVID-19 pandemic, influenza was the most commonly identified cause of viral CAP,[10] with the young children (<5 years of age) and older adults (≥65 years of age) at highest risk.[27] Peaks of influenza activity occur seasonally.[28] The 2019 IDSA/ATS guidelines recommend rapid testing for influenza during peak times.[4] Vaccination decreases influenza incidence and associated morbidity and mortality.[29] Following the release of the COVID-19 vaccine, influenza vaccination rates decreased,[30] the impact of which is yet to be determined.

DIAGNOSTIC MODALITIES

There are many potentially useful diagnostic modalities in pneumonia. Importantly, the utility of the modalities may differ between the ED and inpatient settings. For example, though frequently obtained in the ED, sputum and blood cultures take several days to result and are therefore not available to ED physicians. Similarly, laboratory markers with a single value may have limited value in the ED but may have clinical utility if trended. Therefore, the following discussion is focused primarily on strategies used in the ED. Nevertheless, we emphasize that studies that may not be useful in the ED should still be sent to assist downstream clinicians caring for the patient after ED disposition, particularly as it pertains to tailoring or de-escalation of antibiotic therapy.

Chest Imaging

One component of the current standard definition of pneumonia is a positive chest radiograph. However, a recent meta-analysis estimated the sensitivity and specificity of a chest radiograph for pneumonia to be 75%.[31] Debate exists in the literature among experts about whether positive chest radiography should be required.[32] Computed tomography (CT) has been proposed as a potential alternative imaging test as it is more accurate and this has a demonstrated effect on clinical management.[33–35] Nevertheless, a recent trial showed no difference in short-term functional health, hospital admissions, and length of stay, suggesting that though more pneumonias may be detected with CT imaging, these findings may not improve patient outcomes and therefore there is insufficient evidence to support a change in the standard of care.[36] Further research is needed before a definitive recommendation can be made about whether CT imaging should be used routinely to diagnose CAP.

The question remains—what should clinicians do with (1) high clinical suspicion and negative chest radiograph and (2) low clinical suspicion and a vague chest radiograph report? Based on the available evidence and current guidelines, we recommend treating empirically in both above cases. The primary driver for this recommendation is the phenomenon of delayed or initially negative chest radiograph findings[37,38] and data showed positive CT findings of pneumonia with negative chest radiographs.[33–36,39] Further, this is consistent with current IDSA/ATS guidelines that no laboratory test currently exists to reliably and rapidly differentiate viral from bacterial causes of pneumonia[5,4].

Ultrasound is another tool that emergency physicians can use to identify lung pathology, including CAP. Lung ultrasound can narrow the differential diagnosis in ED patients with dyspnea.[40] One study demonstrated good accuracy of emergency physician performed lung ultrasound compared to chest radiograph for pneumonia diagnosis.[41] However, this study enrolled a convenience sample, and ultrasounds were performed by physicians with ultrasound training and 2 or more years of experience, limiting generalizability. Another recent study failed to demonstrate an advantage of ultrasound over chest radiograph.[42] We recommend considering the use of lung ultrasound, particularly by emergency physicians with ultrasound training, particularly as a “rule in” rather than “rule out” tool, pending further studies.

Blood and Sputum Culture

Although the results of blood and sputum cultures will not be available to emergency physicians when making treatment decisions, it is important that emergency physicians understand when to send these prior to antibiotic treatment. The 2019 IDSA/ATS guidelines recommend blood and sputum cultures in “patients with severe disease as well as in all inpatients initiated on empiric therapy that includes coverage for *Methicillin-resistant Staphylococcus aureus* (MRSA) or *Pseudomonas aeruginosa*.” Additionally, the IDSA/ATS guidelines provide conditional recommendations to obtain blood and sputum cultures in patients who “were previously infected with MRSA or *P aeruginosa* or were hospitalized and received parenteral antibiotics in the last 90 days.” A recent observational cohort study confirms that the highest utility of blood culture is in patients with severe CAP (14.7% with bacteremia).[43] The centers for medicare & medicaid services (CMS) SEP-1[44] mandate to obtain blood cultures prior administering antibiotics in patients being admitted with signs of sepsis may further expand the group of patients requiring blood cultures.

Utility of sputum culture depends on a good quality specimen and the ability to obtain high-quality sputum specimens in EDs has been questioned. A recent study

demonstrated that tracheal suction has superior quality to expiratory techniques[45] In the ED, tracheal suction can be readily performed only in intubated patients. Importantly, a recent study demonstrated that no ED empiric antibiotic choices were changed by sputum culture results when available.[46] Advances in point of care testing, such as PCR tests (see later discussion), may lead to better tools for determining CAP etiology from sputum specimens and potentially affecting ED treatment decisions.

Urine Antigen Detection

Urine antigen testing is available for *S pneumoniae* and *Legionella pneumophila*.[47] The IDSA/ATS guidelines do not recommend routinely testing for these causes except in 2 clinical scenarios: (1) based on epidemiologic factors and (2) in those with severe CAP. Epidemiologic factors include known *Legionella* outbreak or recent travel to high-risk areas.[4] Their reasoning is that testing did not change patient-centered outcomes including death, clinical relapse, ICU admission, hospital length of stay, duration of antibiotic treatment, or cost of treatment.[48,49]

In the appropriate geographic area, emergency providers should consider testing for histoplasmosis, coccidioidomycosis, or blastomycosis with urine testing or IgG/IgM depending on standard at your hospital and can assist with early detection but is not the gold standard test (identification via culture or histologic examination).[50]

The ACEP guidelines do not recommend withholding or altering initial ED antibiotic treatment based on the result of urinary antigen tests[5] due to low rates of definitive cause identification in previous literature. Of note, due to frequent colonization, urinary antigen tests are not recommended in children.[51]

Polymerase Chain Reaction Pathogen Identification

Recent guidelines agree that there is low evidence for the routine use of viral pathogen PCR assays in CAP.[4,5,7] This is because the exact meaning of positive results is unknown as it may represent only asymptomatic upper respiratory colonization, coinfection or prior infection, rather than the cause of lower respiratory infection; for example, one-quarter of asymptomatic children had a positive test.[51,52] Newly available PCR assays that include bacterial and viral targets utilize sputum or bronchial samples. However, as previously mentioned, obtaining high-quality sputum samples in the ED is challenging and will impact the diagnostic yield of such assays.[20] Bronchiolar lavage likely provides better accuracy, but it is not feasible for routine use in the ED.

However, counter-arguments emerging in the literature should be considered. A recent study demonstrated high agreement of PCR testing between oropharyngeal samples and lower respiratory tract samples in ED patients with CAP.[53] Therefore, the authors recommend determining the potential utility in your own practice based on (1) quality of procedures for sputum collection in your ED and (2) which pathogens are included on your hospital's panel.

Methicillin-resistant Staphylococcus aureus Polymerase Chain Reaction

Nasal MRSA PCR swabs are primarily used for de-escalation, stopping anti-MRSA therapy in patients who were initially covered for MRSA empirically. While unable to distinguish infection from colonization, the negative predictive value for MRSA pneumonia using the nasal swab ranges from 75% to 99%.[4,54,55]

Host-response Biomarkers

No available biomarker, in isolation, can reliably identify the presence of pneumonia or differentiate viral from bacterial pneumonia. Neither ACEP nor IDSA/ATS currently

recommend their routine use.[5] However, this is an ongoing area of research and it is unclear how these assays may perform in combination (eg, viral PCR plus biomarkers) and in conjunction with estimates of pretest probability.

Procalcitonin

Procalcitonin as a laboratory marker of bacterial pneumonia deserves specific discussion, as research is ongoing and rapidly expanding. The traditional critique of procalcitonin is that a single value cannot be used to determine decision making. However, a recent study compared the outcomes of patients with suspected viral lower respiratory infection and low procalcitonin randomized to azithromycin or placebo and demonstrated noninferiority.[56] Experts debating the strengths and limitations of this study conclude that using procalcitonin in this manner, which could be directly applied to EDs, be considered.[57] However, the largest ED-based US trial, ProACT Trial, demonstrated minimal differences in antibiotic prescribing and no difference in short- or long-term mortality between those treated on a procalcitonin-guided pathway or not.[58–60] The lack of effect on antibiotic prescribing was in part driven by providers not following the procalcitonin guidance, suggesting lack of confidence in the test may be a barrier to adoption. Additionally, emergency providers may be asked to obtain procalcitonin because serial procalcitonin measurements may have utility in de-escalating inpatient antibiotic therapy[61,62]

MeMed BV

Since the publication of existing guidelines, MeMed BV (MeMed Diagnostics, Ltd) was Food and Drug Administration (FDA)-approved as a test to differentiate bacterial and viral respiratory infections. A recent study in the US ED demonstrated that while the test is clinically feasible, less than half of the MeMed BV results were viewed prior to administration of antibiotics.[63] Thus, while the data on MeMed BV are promising, further study on both implementation and outcomes are necessary before a definitive recommendation can be made.

RISK STRATIFICATION

There are many risk stratification tools available for CAP to aid the clinician in deciding appropriate patient disposition (eg, discharge, hospital admission, or ICU admission). Validated clinical decision rules include the Pneumonia Severity Index (PSI),[64] CURB-65,[65] and A-DROP.[66] For ED use, the ACEP guidelines recommend PSI and CURB-65 to support clinical judgment to assess which patients may be appropriate for discharge. The IDSA/ATS favor PSI over CURB-65.[4] A recent study showed similar performance between CURB-65 and A-DROP in ED patients.[67] The ACEP guidelines recommend using the IDSA/ATS minor criteria (see **Table 1**) to assess need for ICU admission.[5] However, the results of recent literature have been mixed regarding clinical utility of such tools in the ED[68,69] supporting the ACEP guideline assertion that these should only be one part of clinician decision-making.

SPECIAL POPULATIONS

Pediatrics

The 2011 Pediatric Infectious Diseases Society and IDSA CAP pediatric guidelines are the current standard.[6] The most common cause of pneumonia in pediatric patients is viruses. The advent of widespread vaccine use has decreased the incidence of CAP caused by *Haemophilus influenzae* type B and *Pneumococcal pneumoniae*.[51,70]

Pediatric symptoms of pneumonia are hard to distinguish from other causes of respiratory illness.[51] Treatment with antibiotics was previously guided by the World Health Organization respiratory rate criteria[70]; the goal of this criterion was to identify children at risk of death. A more recent systematic review did not find tachypnea associated with pneumonia. Instead, hypoxemia and work of breathing were associated with pneumonia diagnosis.[70,71]

Importantly, the guidelines recommend avoiding routine use of chest radiography in patients well enough to be treated as an outpatient (discharged from the ED).[6] Emergency physicians should be aware of these guidelines as a recent paper suggests overuse of chest radiograph.[72] Further, the use of diagnostic modalities for pediatric patients with fever differs between general and pediatric EDs.[73] Thus, emergency physicians should aim to follow the guidelines and only obtain chest radiograph in pediatric patients when admission is required.

Geriatrics

Pneumonia incidence[74]-related hospitalizations[15] and in-hospital mortality[75] all increase with age. Because 3 out of 4 adults $\geq$65 years of age who are hospitalized with pneumonia are initially treated in the ED,[76] emergency providers must know how to maximize diagnostic accuracy in this population. Unfortunately, CAP in older adults poses a diagnostic challenge to emergency physicians and our inpatient colleagues.[77,78] Geriatric-specific factors that contribute to this challenge include atypical presentations[17,18,79–84]; having fewer specific symptoms (ie, shortness of breath, fever) than young patients; reduced accuracy of chest radiographs[85]; and presence of comorbidities that can mimic CAP.[86,87] The utility of the current clinical definition of pneumonia is unknown in this population, and geriatric-specific pneumonia diagnostic criteria have been developed in non-ED health care settings.[88,89] While older adults residing in long-term care facilities are also at risk for drug-resistant organisms,[90] the current guidelines do not recommend any changes to standard risk factor-based empiric therapy in older adults with nonsevere CAP, regardless of living situation.[4]

Recent Foreign Travel

Depending on the site of recent travel, pulmonary symptoms in a returning traveler may have an atypical cause based on location; for example, in travelers to South and Central Asia, diphtheria, tuberculosis, and avian flu are common but rare causes such as Nipah virus may need to be considered.[91,92] Clinicians should consider testing and treatment for atypical causes based on endemic and potential novel pulmonary diseases found in the areas of recent travel. The Centers for Disease Control and Prevention (CDC) maintains online resources for clinicians including but not limited to regions of common exposure, presentation, incubation periods, and treatment.[93] An infectious disease specialist should also be consulted, when there is suspicion of pneumonia due to an unusual or novel pathogen acquired while traveling. For example, at the time of this writing, the CDC includes COVID-19, avian influenza, Middle East respiratory syndrome, among others for consideration.[93]

Immunocompromised

Immunocompromised patients are at higher risk for atypical causes of pneumonia across the age span,[51,94] but there is no consensus on how this should affect the empiric antibiotic treatment.[94] Immunocompromised patients are excluded from the CAP guidelines. Clinicians should consider early infectious disease consultation in these patients.

Patients at Risk for Aspiration

Aspiration pneumonia has been proposed as a common cause of pneumonia, particularly in older adults.[95–97] Whether or not anaerobic coverage is necessary in suspected aspiration, pneumonia is not clear according to a recent systematic review and meta-analysis.[98] The IDSA/ATS guidelines suggest only adding anaerobic coverage if lung abscess or empyema is suspected.[4]

TREATMENT RECOMMENDATIONS

The IDSA/ATS guidelines state, and the ACEP agrees, "there is no current diagnostic test accurate enough or fast enough to determine that CAP is solely due to a virus at presentation, our recommendations are to initially treat empirically for possible bacterial infection or coinfection."[4] Thus, empiric treatment with antibiotics is the current recommendation. The COVID-19 pneumonia may represent an exception to this recommendation. Empiric therapy recommendations in this section focus on the adult population. For outpatients with no comorbidities, treatment primarily focuses on coverage of *S pneumoniae* with either amoxicillin or doxycycline (**Table 1**). Doxycycline has the advantage that it covers atypical organisms and may provide *H influenza* and *S aureus* coverage. While azithromycin monotherapy historically has been used for outpatient pneumonia, macrolide resistance has increased and azithromycin should only be used if a local antibiogram shows macrolide resistance of less than 25%. Many patients presenting to the ED with pneumonia will have additional comorbidities placing them at risk for resistant pathogens and poor outcomes if initial empiric therapy is inadequate. Thus, in addition to *S pneumoniae* coverage, outpatients with significant comorbidities should receive a regimen that covers *H influenzae* and *Moraxella catarrhalis*, *S aureus,* some gram-negative bacteria, and atypical pathogens. This can be accomplished with either combination therapy consisting of a beta-lactam and a beta-lactamase inhibitor (amoxicillin-clavulanate) plus doxycycline or a macrolide or monotherapy with a respiratory fluoroquinolone (levofloxacin or moxifloxacin). However, providers should consider the potential for collateral damage with fluoroquinolones, including tendinitis, tendon rupture, and peripheral and central nervous system effects. Additionally, a new fluoroquinolone black box warning was issued in 2018 regarding risk for aortic aneurysm or dissection and potential mental health side effects.[99] These black box warnings pertain to older adult patients disproportionately.

For patients being admitted to the hospital, a beta-lactam plus a macrolide or doxycycline are the favored combination,[4,7] but local resistance patterns as well as patient-specific risk factors will strongly impact the recommended empiric therapy (see **Table 1**). The IDSA/ATS guidelines focus on previous growth of MRSA or *P aeruginosa* from respiratory cultures, hospitalization with parenteral antibiotics in the past 90 days as risk factors that should prompt broad-spectrum empiric therapy. The guidelines also encourage the development of locally validated risk factors for MRSA or *P aeruginosa* when selecting empiric regimens; the feasibility of this recommendation and the potential impact on ED empiric therapy selection have just begun to be studied.[100] In patients receiving empiric therapy for MRSA and *P aeruginosa*, it is important to obtain sputum cultures and nasal MRSA PCR screening, which if negative may allow de-escalation and less exposure to broad-spectrum antibiotics.

There are recent data confirming that patients meeting the IDSA/ATS criteria for severe CAP[4] have higher rates of positive blood cultures and higher organ failure scores and mortality. While a resistant organism was isolated in about 10% of these cases, which supports maintaining a low threshold for broad empiric coverage in severe

Table 1
Antimicrobial treatment considerations

Setting and Severity	Patient Characteristics	Antimicrobial Recommendations
Outpatient	No comorbidities or risk factors for MRSA or *P aeruginosa*	Amoxicillin (high dose) OR Doxycycline OR Macrolide[a] (only if local pneumococcal resistance is <25%)
	Comorbidities, including chronic heart, lung, liver or renal disease, diabetes mellitus, alcoholism, malignancy, or asplenia	Combination therapy • Amoxicillin/clavulanate OR cephalosporin[b] • Atypical coverage (doxycycline OR macrolide)[a] OR Respiratory fluoroquinolone monotherapy[c,d]
Inpatient, nonsevere pneumonia	No prior respiratory cultures with MRSA or *P aeruginosa*	Beta-lactam[e] PLUS atypical coverage[a] OR Respiratory fluoroquinolone monotherapy[c,d]
	Prior respiratory isolate with *MRSA* or local validated risk factors for MRSA [f]	Add vancomycin or linezolid
	Prior respiratory isolate with *P aeruginosa* within 1 y, local validated risk factors or advanced structural lung disease[f]	Antipseudomonal beta-lactam[h] PLUS atypical coverage[a] OR respiratory fluoroquinolone
	Recent hospitalization with parenteral antibiotics[f,h]	Beta-lactam[e] PLUS macrolide[a] OR Respiratory fluoroquinolone monotherapy[c,d]

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Table 1
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Setting and Severity	Patient Characteristics	Antimicrobial Recommendations
Inpatient, severe pneumonia	No prior respiratory cultures with MRSA or *P aeruginosa*	Beta-lactam[e] PLUS macrolide[a] OR Respiratory fluoroquinolone monotherapy[c,d]
	Prior respiratory isolate with *MRSA*[f] or recent hospitalization with parenteral antibiotics and locally validated risk factors for MRSA[f]	Beta-lactam[f] PLUS macrolide[a] OR Respiratory fluoroquinolone[c,d] PLUS vancomycin or linezolid
	Prior respiratory isolate with *P aeruginosa*[g] or recent hospitalization with parenteral antibiotics and locally validated risk factors for *P aeruginosa*[g]	Antipseudomonal beta-lactam[h] PLUS macrolide[a]

[a] Azithromycin, clarithromycin, or doxycycline.
[b] Cefpodoxime, cefuroxime.
[c] Levofloxacin, moxifloxacin, gemifloxacin
[d] Fluoroquinolones should be reserved only if other agents are not clinically appropriate given the potential risks (hypoglycemia, mental status changes, effects on tendons, joint, muscles and nerves, and aortic aneurysm/dissection)[105].
[e] Ampicillin/sulbactam, cefotaxime, ceftriaxone.
[f] Obtain cultures and/or nasal MRSA PCR.
[g] Should be driven by local antibiogram but may include piperacillin/tazobactam, cefepime, ceftazidime, imipenem, meropenem, or aztreonam.
[h] Only initiate coverage for MRSA if results positive.

CAP, a much higher proportion received vancomycin and/or piperacillin–tazobactam.[101] These findings underscore the recommendation above to obtain all appropriate diagnostic studies, which might allow later de-escalation of broad-spectrum therapy.

A common clinical practice in EDs is to give 1 dose of intravenous antibiotics followed by initiation of an oral regimen, based on factors such as antimicrobial bioavailability, intestinal absorption, and ability to tolerate oral medications. The ACEP found a lack of evidence to support or refute this practice.[5] In the absence of clear clinical benefit, increased cost and potential increased length of ED stay, we do not advise this practice.

A routine addition of corticosteroids to antibiotics in CAP is not recommended.[4] Recently published studies evaluating the use of hydrocortisone and methylprednisolone in patients with severe CAP have shown mixed results, though the expert consensus seems favor giving steroids in this setting.[102,103] Additionally, corticosteroids may have a role in patients with shock, acute respiratory distress syndrome and COVID-19 pneumonia.[4,7]

The recommended duration of antimicrobial therapy for CAP is a minimum of 5 days, depending on the antibiotic and measures of clinical stability and improvement.[4] For patients being discharged from the ED, a prescription for 5 days of therapy is often appropriate. Clear discharge instructions should be provided regarding expected recovery and return precautions. A recent randomized controlled trial comparing antibiotic duration in pediatric CAP found that a 5 day course was superior to 10 days.[104]

SUMMARY

The core principles of pneumonia diagnosis have not changed since 2018. However, the literature regarding diagnostic modalities and treatment strategies is rapidly changing. Keeping abreast of guidelines on CAP diagnosis and treatment is therefore critical for high-quality clinical care. Clinicians should consider specific challenges in certain populations (eg, pediatrics, geriatrics, and international travelers) as well as patient-specific risk factors when selecting empiric antimicrobial therapy.

DISCLOSURE

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